Earth Observation to support sustainable development – providing objective evidence for development cooperation

UNOOSA High Level Forum
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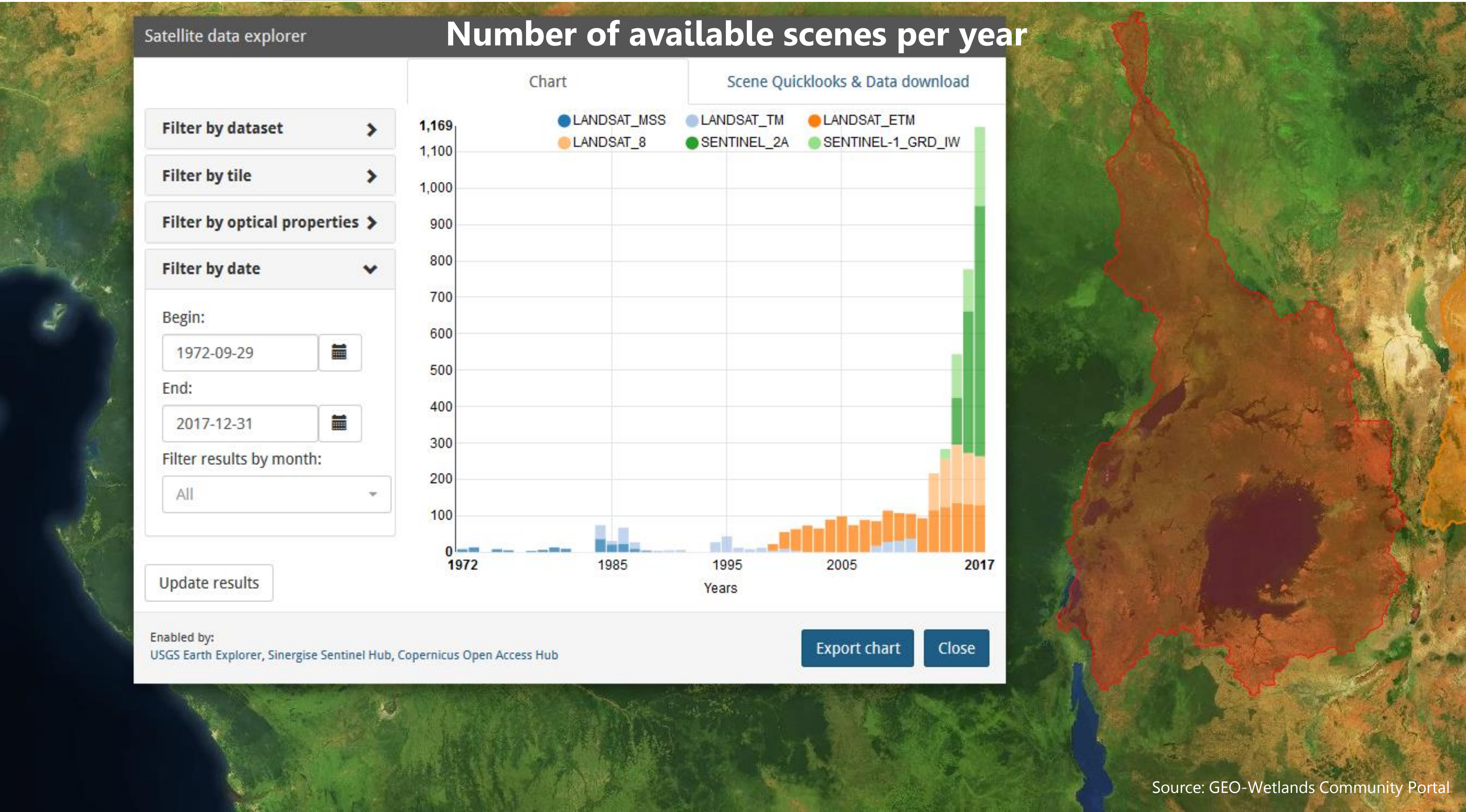
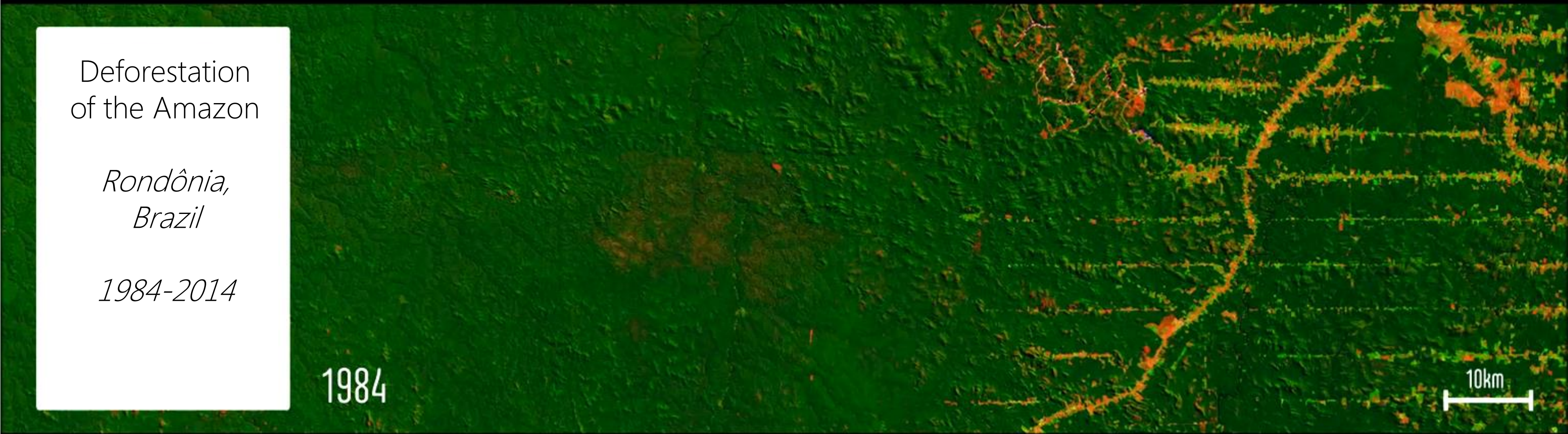
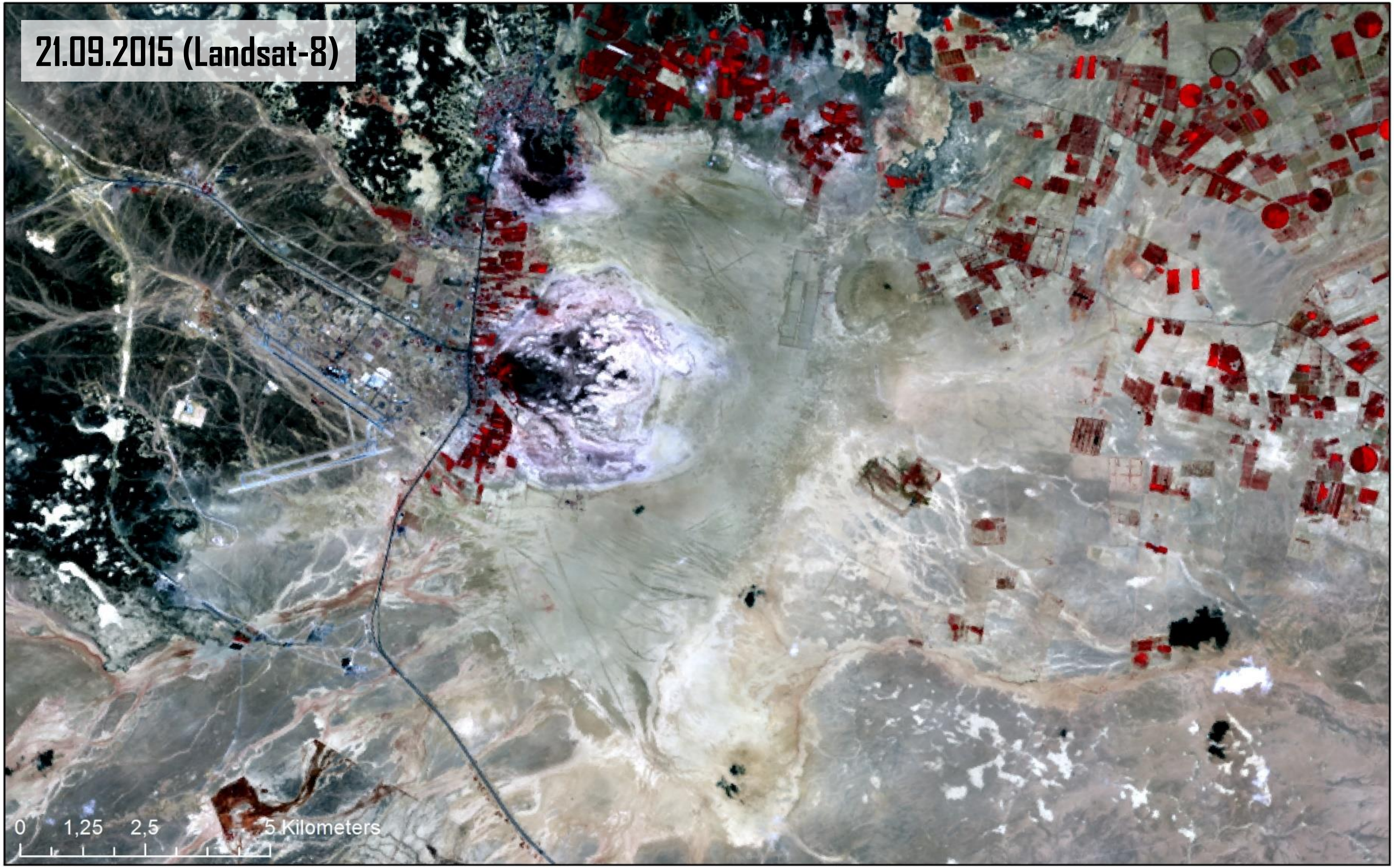
Sentinel-1
Sentinel-3
Landsat TM
Landsat MMS
Landsat ETM+
Landsat-8
MODIS
Sentinel-2

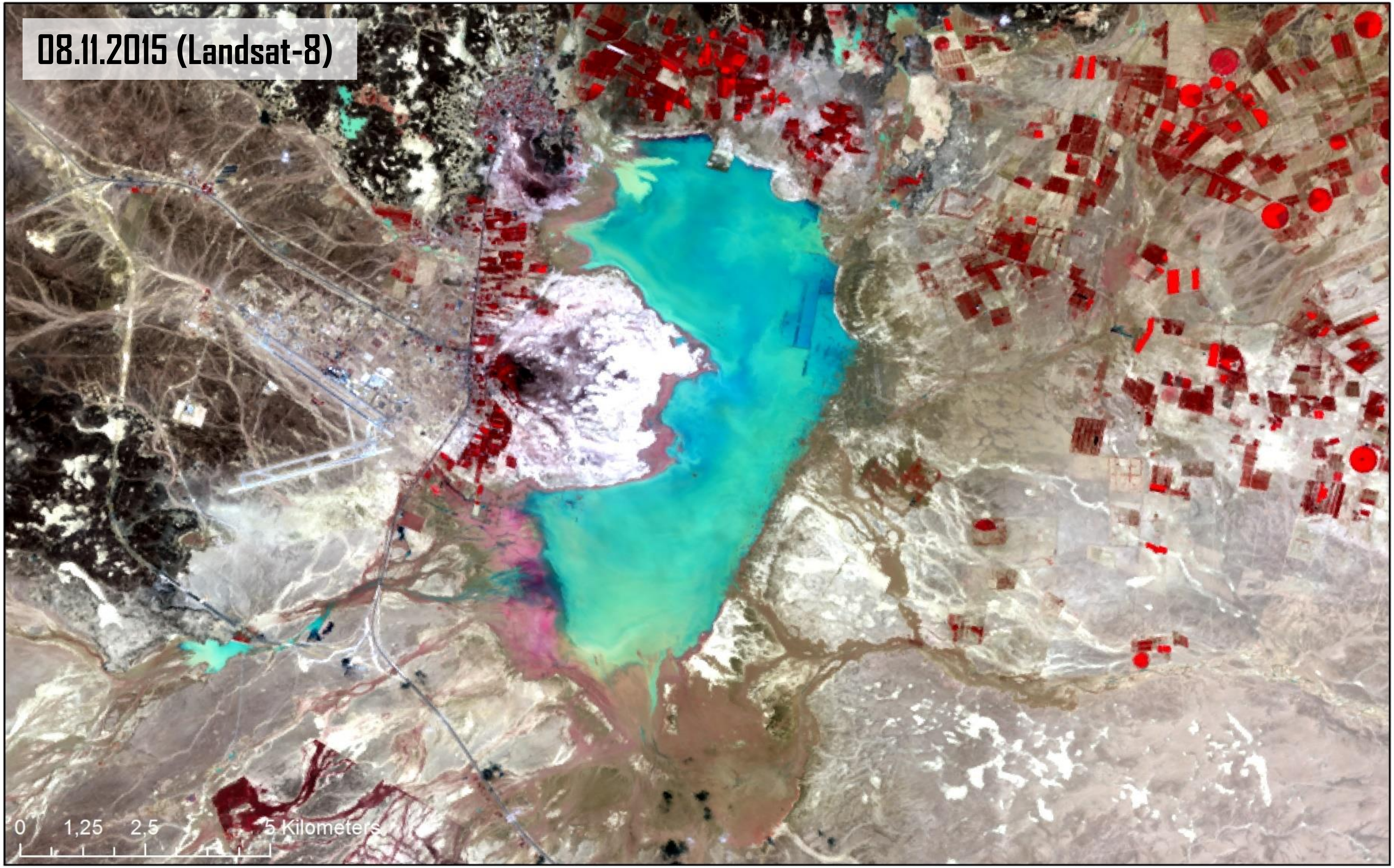
New satellites - new monitoring possibilities



Source: GEO-Wetlands Community Portal


Deforestation
of the Amazon
Rondônia,
Brazil
1984-2014
1984
10km


21.09.2015 (Landsat-8)
0
1,25
2,5
5 Kilometers


08.11.2015 (Landsat-8)
0 1,25 2,5 5 Kilometers

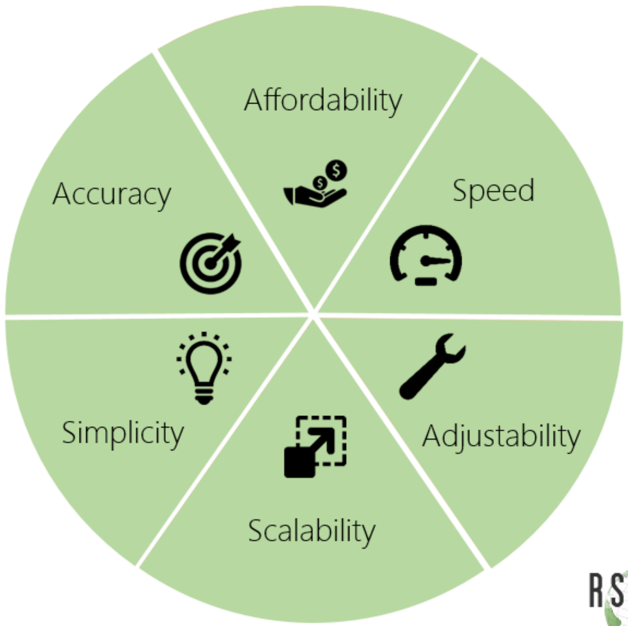

24.11.2015 (Landsat-8)
0 1,25 2,5 5 Kilometers


25.12.2015 (Sentinel-2)
0
1,25
2,5
5 Kilometers

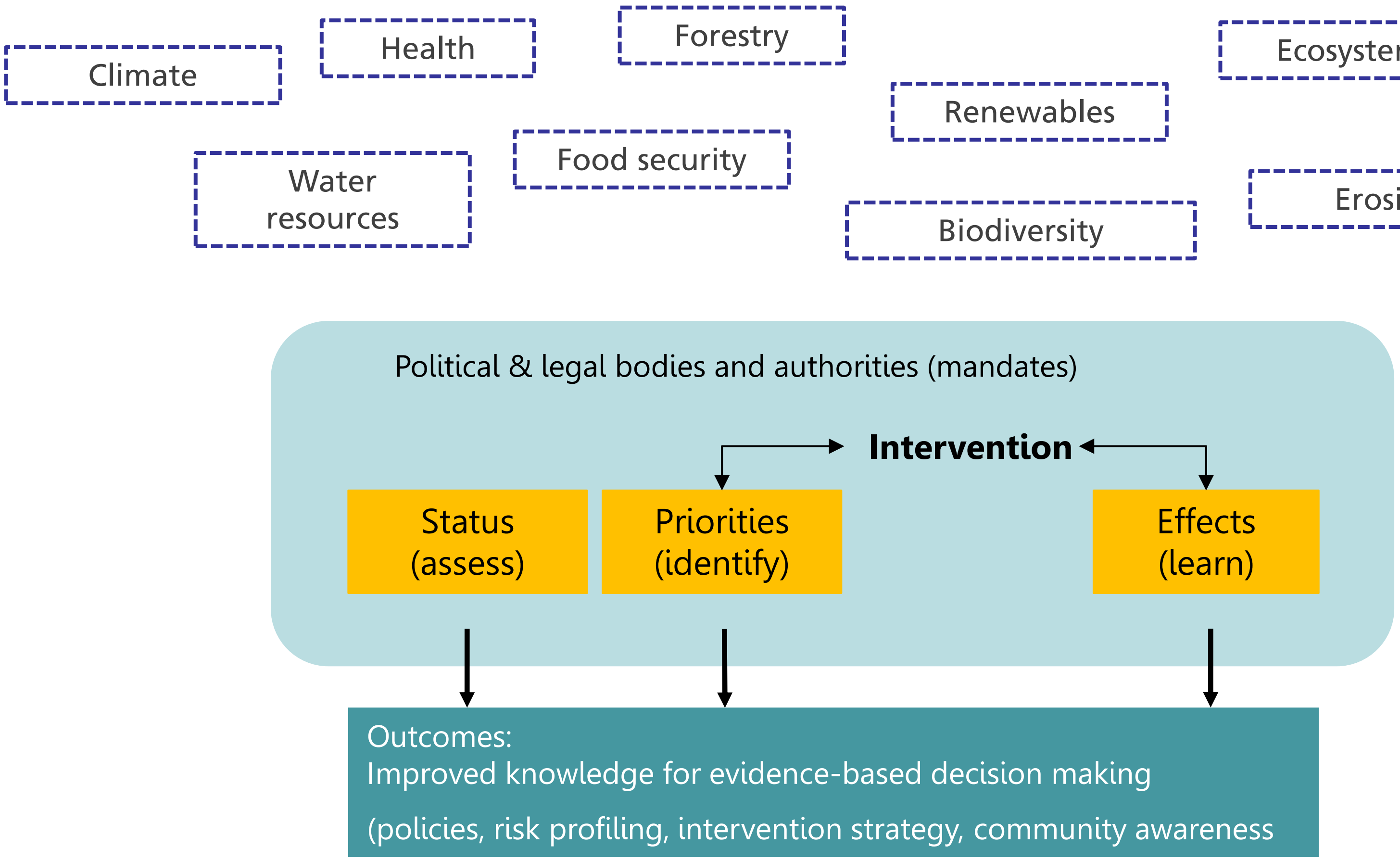
14.01.2016 (Sentinel-2)
0 1,25 2,5 5 Kilometers

General requirements for EO in development cooperation

- Understanding of the political and institutional framework
- Integrative and actor-specific solutions
- Demonstrating benefits at technical working level and policy level
- Easy access and use of EO products
- Sustainability of EO solution
- Capacity development on various levels
- Institutionalization

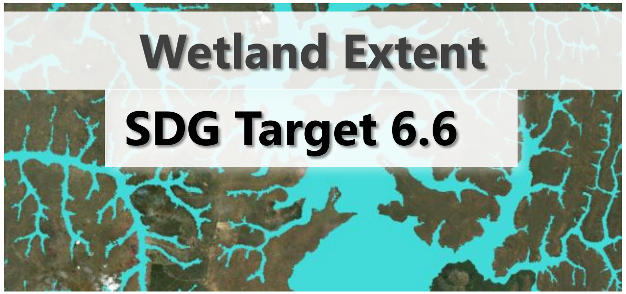


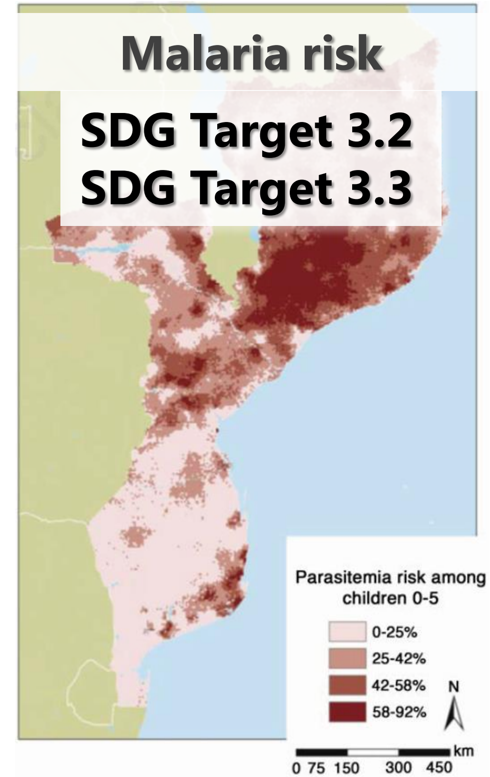
EO supporting development cooperation (simplified)

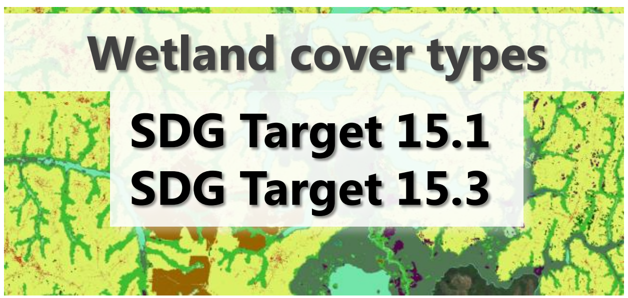


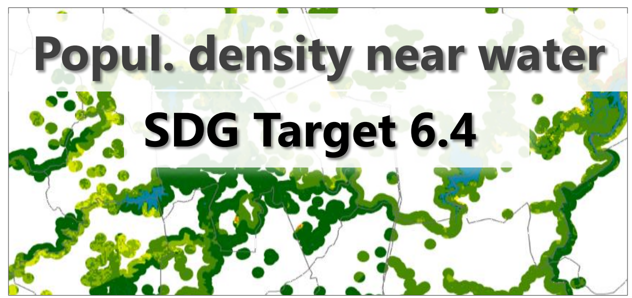
Benefits for development cooperation

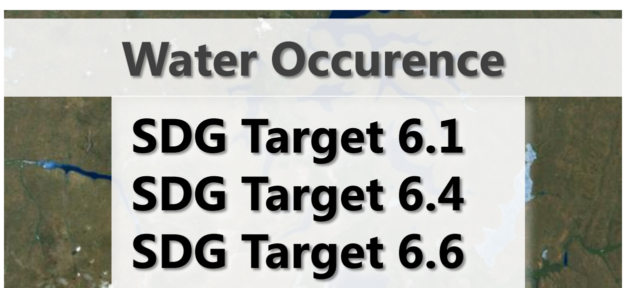
EO can provide a **holistic approach**

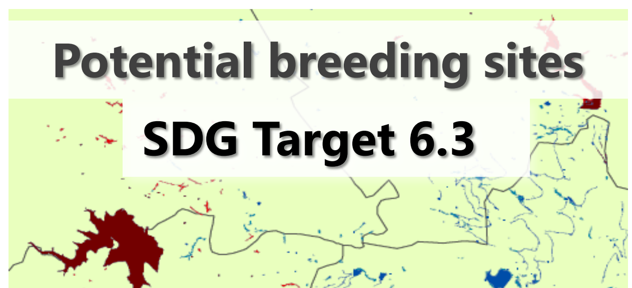












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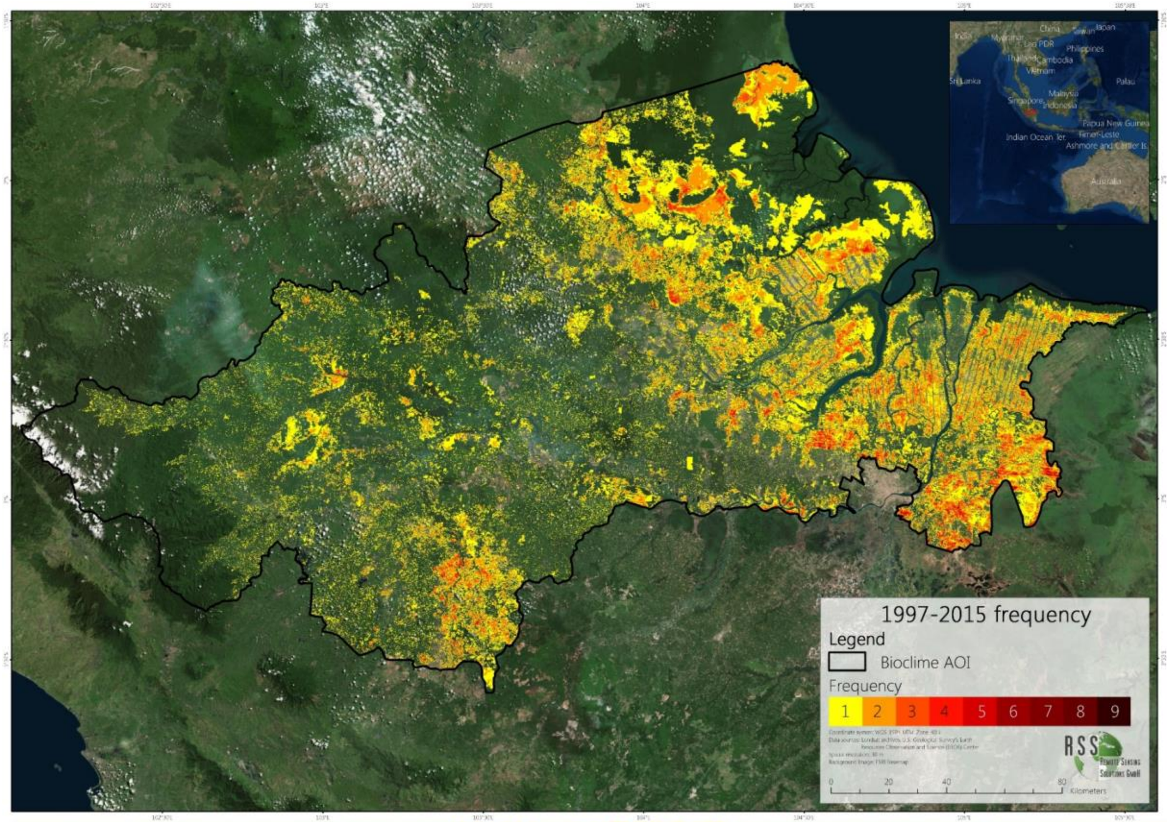
Benefits for development cooperation

EO can support the **planning of interventions**:

Priority maps ideally linked to interventions, value chains, economic viability



Benefits for development cooperation

Supporting the **evaluation of interventions:**

- EO can provide measurable, comparable and quantitative parameters for evaluating the impact of programmes/projects (success indicators)
- Only development cooperation projects with successfully measured indicators can promote further implementation
- Should be considered already in the planning phase of programmes

Spatial variables used as indicators for success of fragmentation of fire risk areas through fire management.

	2013 max. fuel fragment [ha]/total fragment area [ha]	2016 max. fuel fragment [ha]/ total fragment area [ha]	Percentage difference	2013 mean fuel fragment size [ha] with SD	2016 mean fuel fragment size [ha] with SD	Percentage difference
FMZ 1	0.34	**0.30**	**−10%**	102.5 ± 568.7	74.4 ± 545.9	**−38%**
FMZ 2	0.89	**0.16**	**−81%**	322.3 ± 2474.8	50.0 ± 257.5	**−545%**
FMZ 3	0.49	0.45	−8%	268.7 ± 1672.3	121.9 ± 971.2	−120%
FMZ 4	0.39	0.75	92%	90.6 ± 484.8	110.5 ± 1422.3	18%
FMZ 5	0.41	0.39	−4%	79.9 ± 461.2	145.0 ± 1186.6	45%
FMZ 6	0.76	**0.19**	**−75%**	98.9 ± 799.9	35.5 ± 167.9	**−179%**
FMZ 7	0.48	**0.16**	**−66%**	46.3 ± 348.2	14.6 ± 80.2	**−217%**
FMZ 8	0.27	0.66	140%	106.4 ± 435.5	38.8 ± 507.8	−174%
FMZ 9	0.65	0.59	−9%	297.7 ± 2376.6	71.6 ± 955.8	−316%

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german cooperation
DEUTSCHE ZUSAMMENARBEIT

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Capacity development

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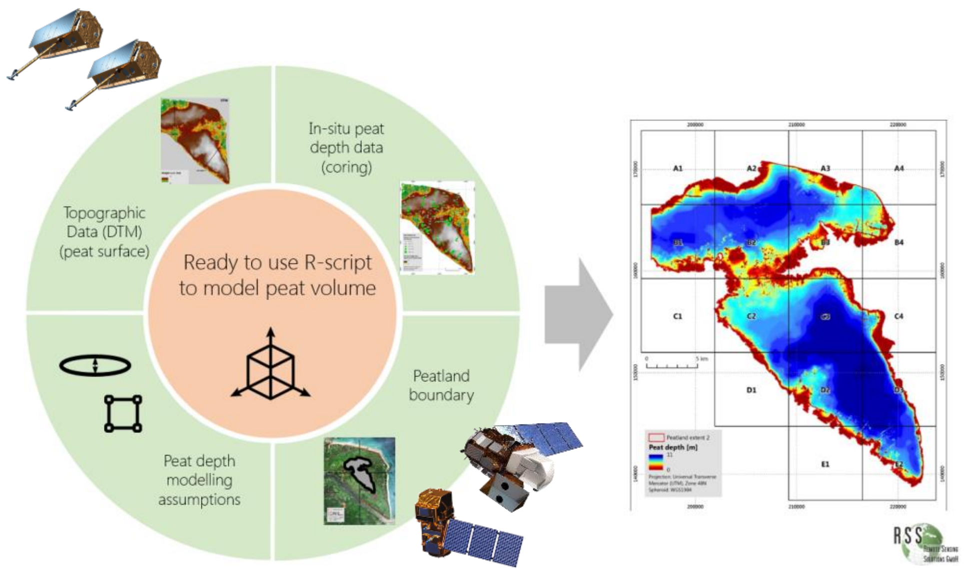
Indonesian Peat Mapping Challenge

- 1 Mio. USD for the most accurate, timely, and cost-effective peatland mapping method
- 44 researcher teams competed over 2 years
- The Scientific Advisory Board selected the International Peat Mapping Team (IPMT)
- Geospatial Information Agency (BIG) defined this method as a standard and issues a regulation on peatland mapping
- The methodology and the final peat maps serves Indonesian government's One Map Policy.

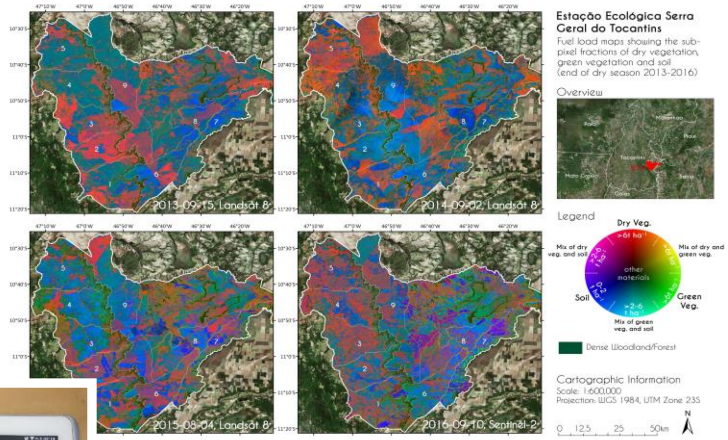


cooperação alemã
DEUTSCHE ZUSAMMENARBEIT
giz

Projeto Cerrado-Jalapão

EO-based support of prevention, control and monitoring of fires in the Cerrado

- Development of a fuel load mapping approach in support of integrated fire management
- Direct support of federal protected area management
- National and state level authorities have successfully institutionalized the approach
- A draft bill of an IFM National Fire Policy has been submitted to the Parliament for approval

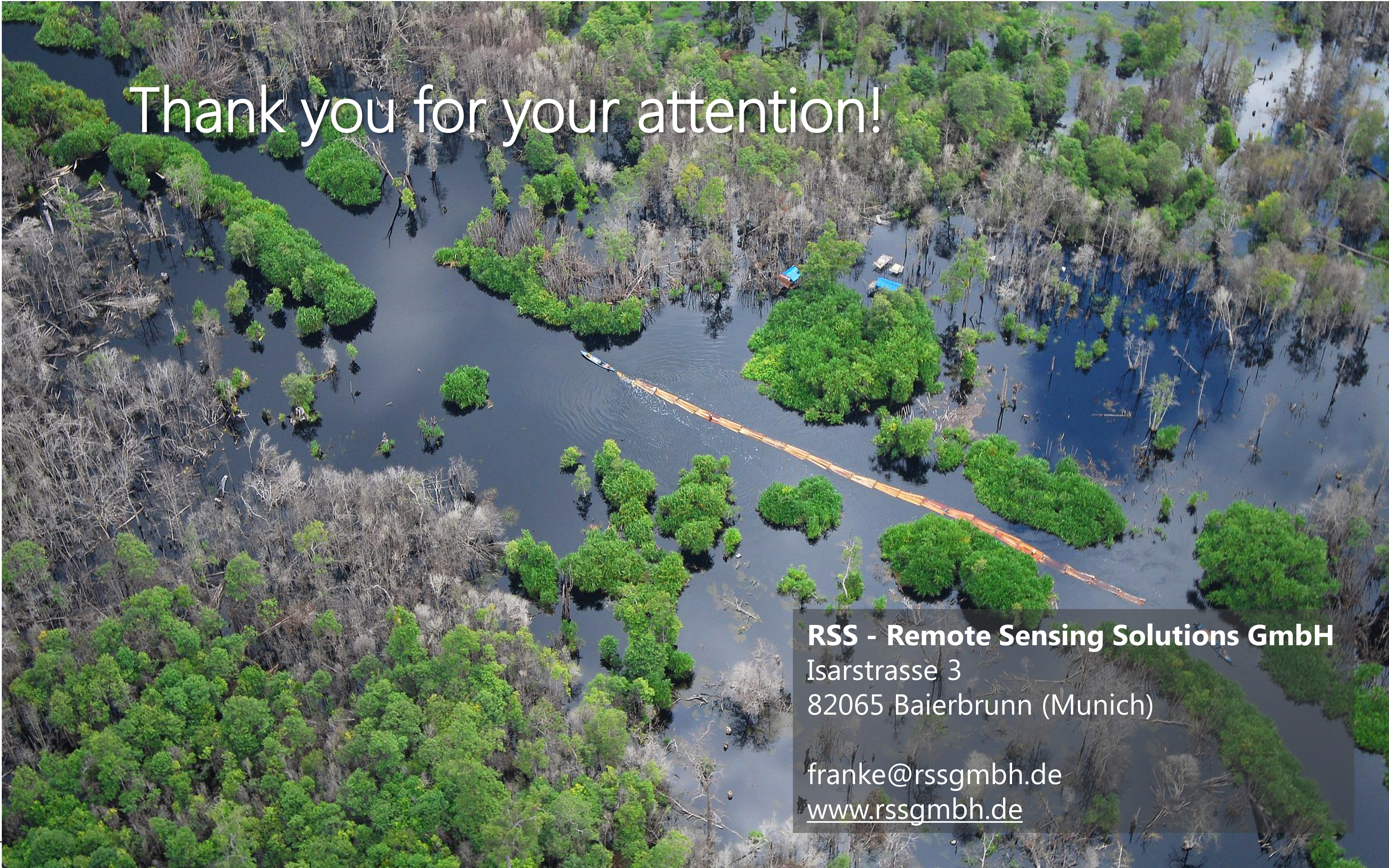


Franke et al. 2018: Fuel load mapping in the Brazilian Cerrado in support of integrated fire management. *Remote Sensing of Environment*.

Photo: A.A. Hoffmann

Key Messages

- Earth Observation can support development cooperation in the assessment, planning and evaluation of interventions
- Helps to prioritize interventions and to understand their impacts
- Institutionalization is key for implementing sustainable EO approaches
- Identification of co-benefits following a holistic approach
- Quantitative spatial indicators are needed to measure socio-ecological impacts of development cooperation programmes
- Best practices of evidence-based decision support through EO can directly influence policies



Thank you for your attention!

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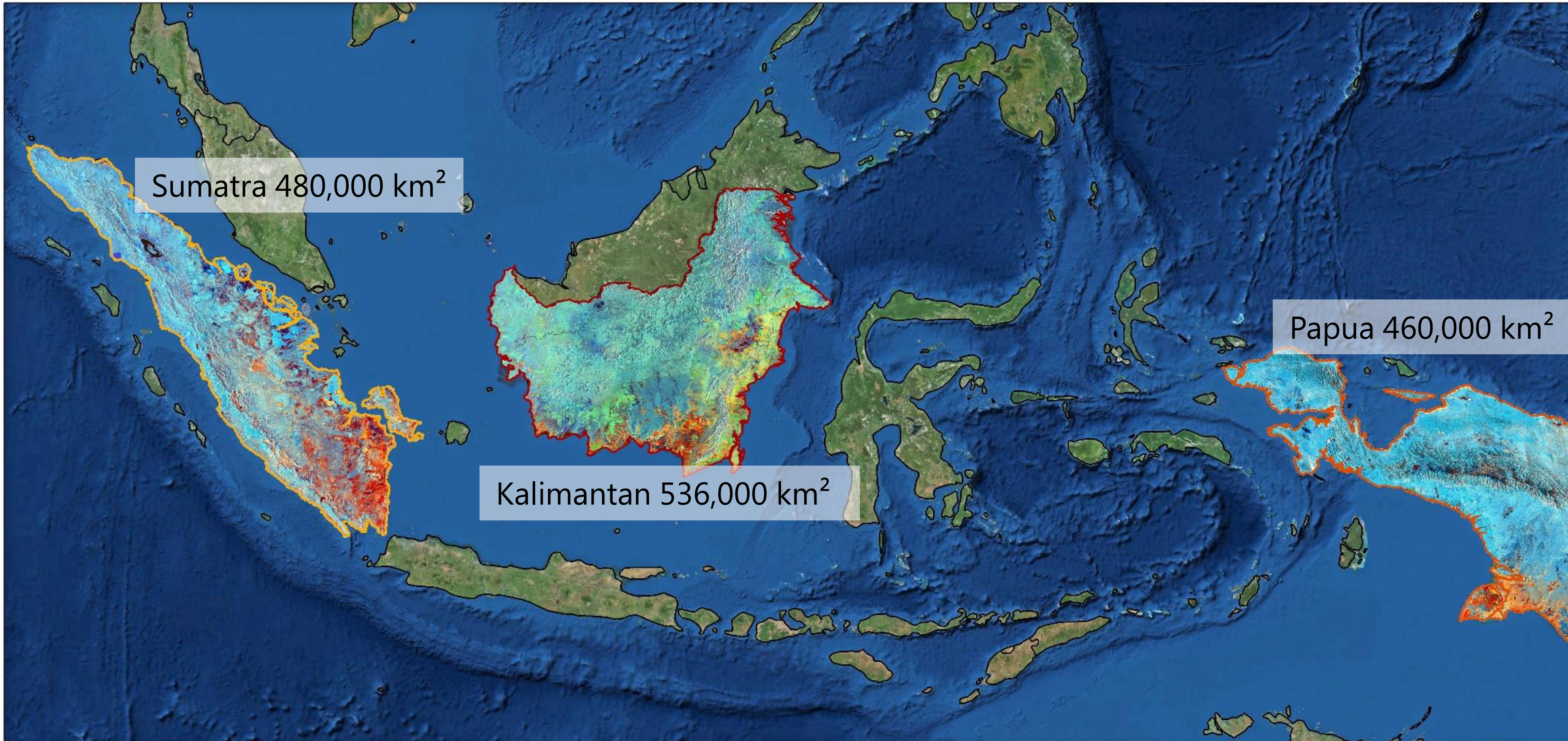
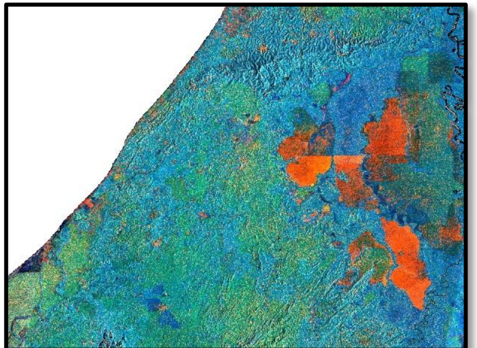
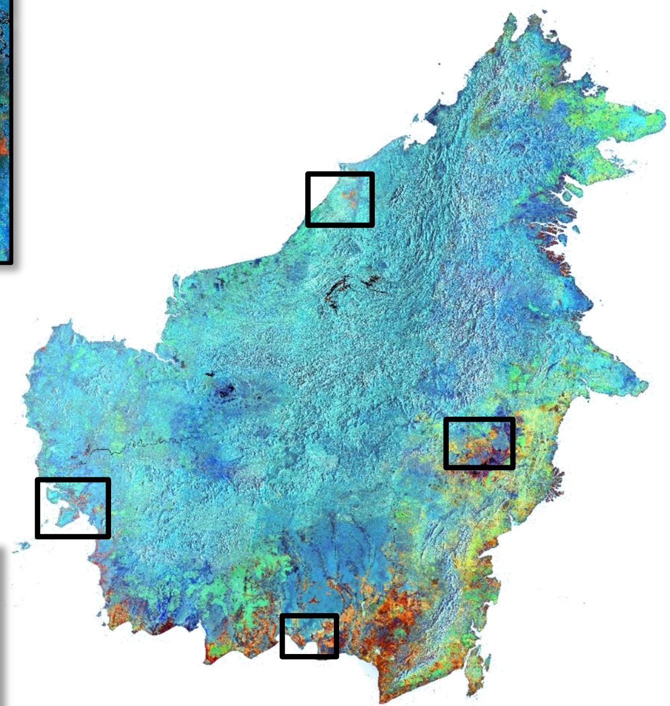
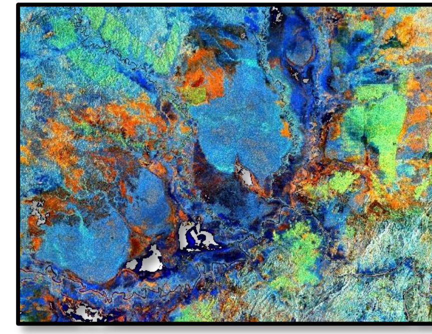
Background and objectives

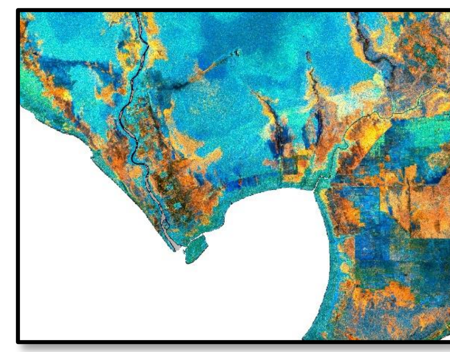


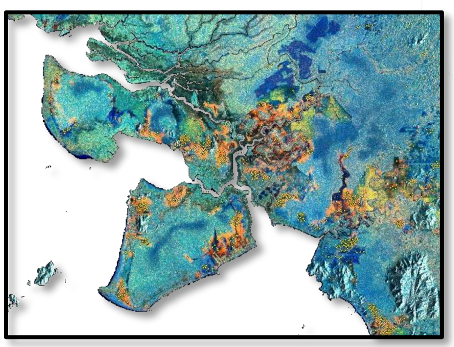
Sentinel-1 mosaic Borneo – Burned areas in high spatial detail







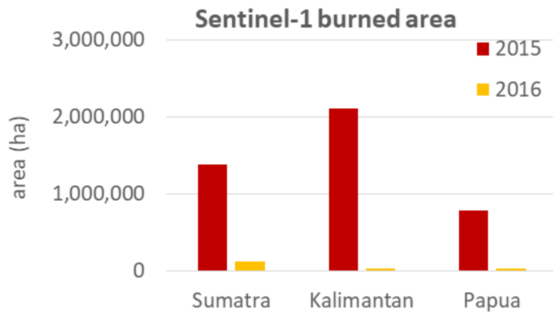




Burned area map in 20 m spatial resolution

Burned area and fire emissions derived from Sentinel-1

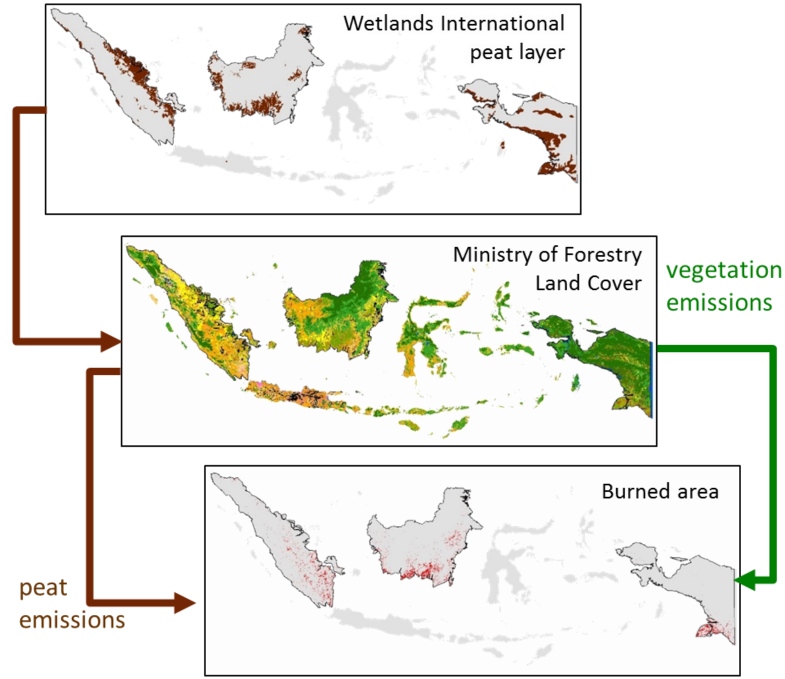
› **Burned area** for
Indonesia's fire catastrophe
2015: 46,046 km^2
2016: 1,751km^2



› **Emissions** include aboveground vegetation and peat emission estimates

	2015	2016
Vegetation:	**0.49 Gt CO2e**	**0.07 Gt CO2e**
Peat:	**0.40 Gt CO2e**	**0.05 Gt CO2e**
Total:	**0.89 Gt CO2e**	**0.12 Gt CO2e**

Lohberger et al. 2017
Global Change Biology

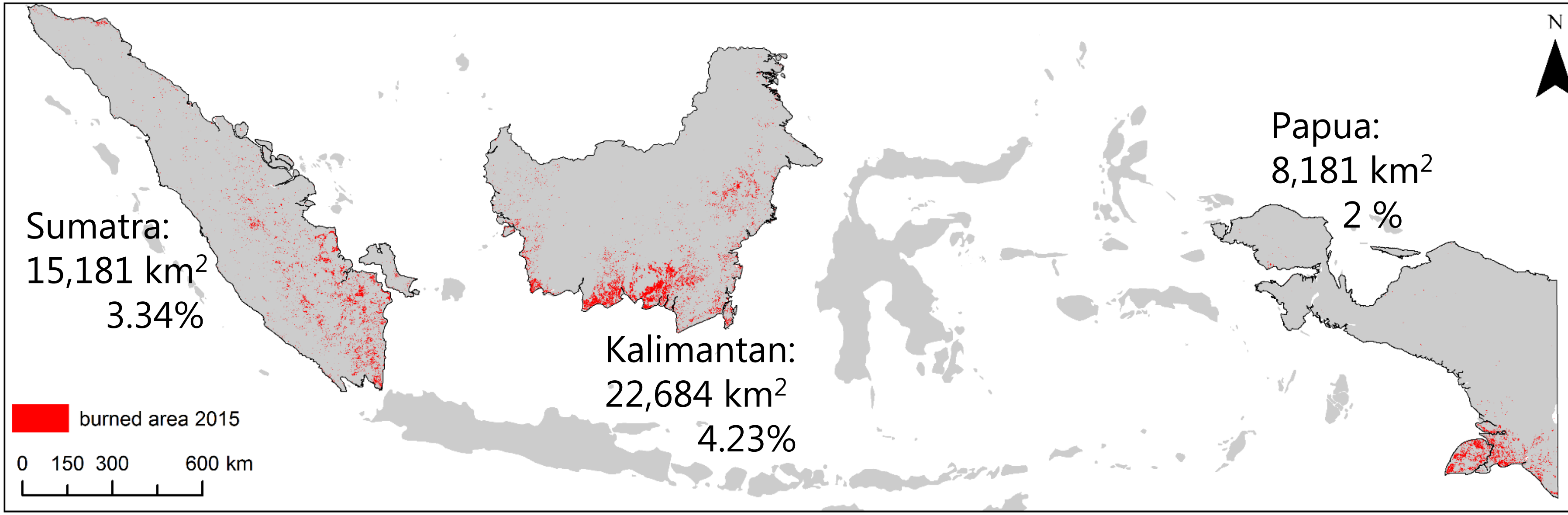


GFED:
1.75 Gt CO2e

Less emissions compared to GFED, result from considering the number of recurrent fires and peat consumption*

*Konecny et al. 2016 Global Change Biology

Results Burned Area 2015



Total burned area: 46,047 km²
3.29%

Peat carbon emissions

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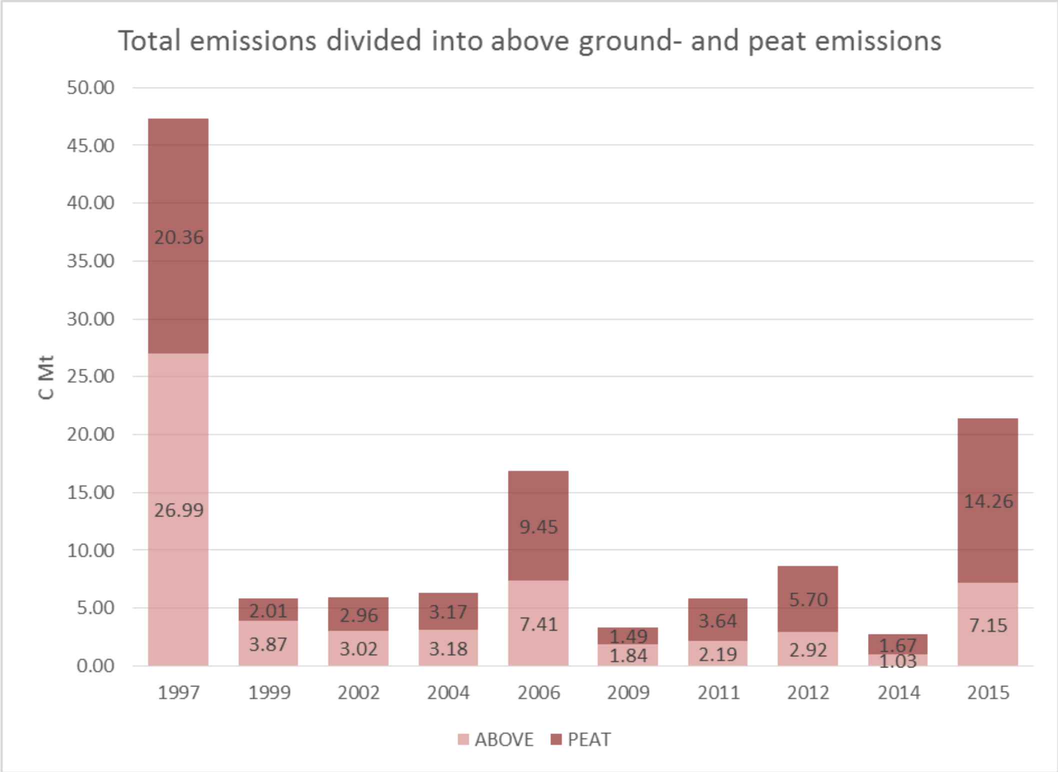
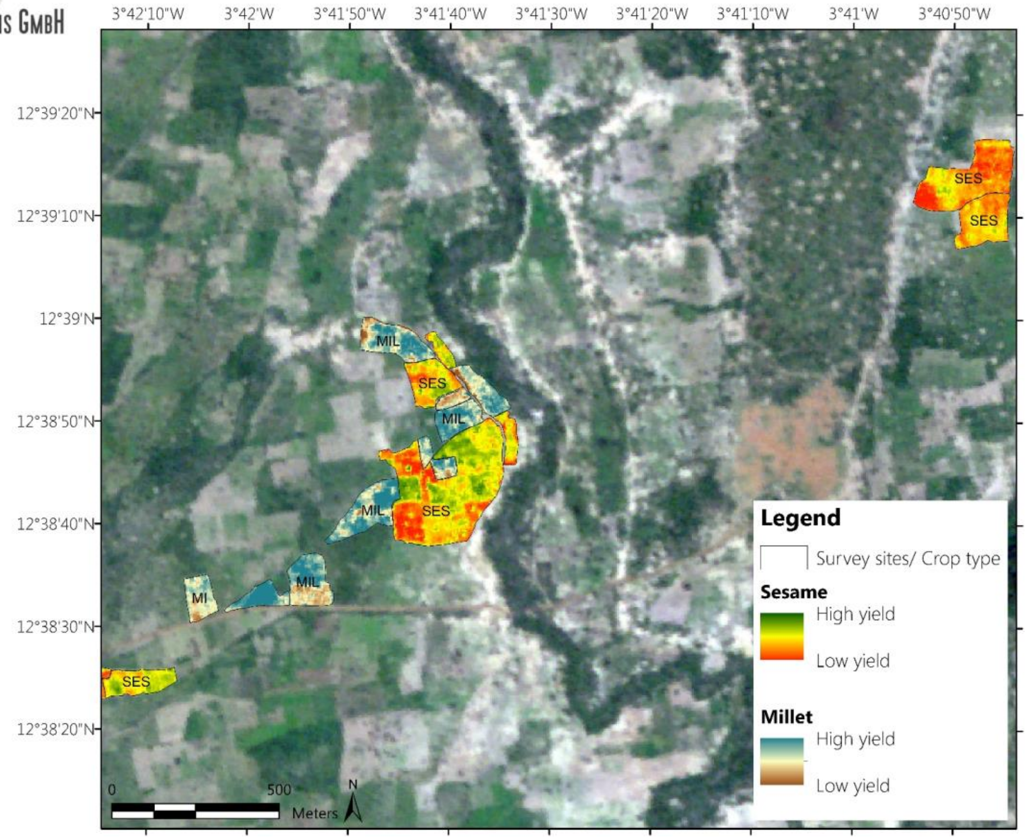


- **The ratio of emissions from aboveground biomass to peat changes over time**
- **In the past proportionally more emissions from aboveground biomass burning**
- **In recent years proportionally more emissions from peat burning**

Qualitative yield prediction per micro-field (Burkina Faso)



Sorgho R, Franke J, Simboro S, Barteit S, Phalkey R, Sauerborn R (2017)
Linking Weather Data, Satellite Imagery and Field Observations to Household Food Production and Child Undernutrition: An Exploratory Study in Burkina Faso.
Universal Journal of Public Health 5(5): 256-270.

Indonesia's Fire and Haze Crisis 2015

CLIMATIC IMPACT

Emissions from burning fossil fuels (GFED)

Global (2014): 35,9 Gt CO_2

Indonesia (2015): 1,8 Gt CO_2

Equals 5 % global emissions

HEALTH IMPACT

~ 50 million humans affected in SE-Asia

ECONOMIC IMPACT

Worldbank: Estimated total costs for the Indonesian economy: USD 16 billion (twice as much as tsunami clean-up)

Source: Today Online http://bit.ly/1Vwy3d1